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Sustainable Cocoa Production Program (SCPP): Analysis of cocoa beans processing and quality in post-harvest in South East Sulawesi in Indonesia

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Abstract— The production of cocoa, introduced in Indonesia during the 1980s, is now decreasing due to many different factors, among them decreased yields due to aging trees, the appearance of pests and diseases, and the farmers not being able to solve these problems due to their lack of knowledge. In 2012, Swisscontact implemented the Sustainable Cocoa Program (SCPP) to improve the competitiveness of the farmers in the cocoa value chain and to increase the productivity of cocoa beans on farm-level. The present study, conducted with the support of Swisscontact, is divided in two main different parts. The first part is a farmer analysis conducted in the district of Kolaka Timur to observe the effect of the SCPP and the UTZ certification on the agricultural practices and the post-harvest method on farm-level. Three different farmers' groups were interviewed: 16 farmers involved in the SCPP and UTZ certified, 22 farmers involved in SCPP without any certification and 20 none-SCPP farmers. 32 women were interviewed as well to evaluate the gender equity in cocoa production. The second part of the study is an analysis of the quality of the cocoa beans by the different stakeholders of the value chain regarding the tools and the use of specific quality criteria. Eight local traders, six processing and trading companies and three associations involved in the cocoa sector were interviewed.The results in the first part show that the SCPP has an impact on the productivity of cocoa beans in the long term: the annual yield is significantly higher in the first group (UTZ-SCPP) and the agricultural practices are improved as well. The SCPP, with the creation of farmers' cooperative, also increased the market access to the farmers. The second part shows that the tools and criteria used for analysing the quality of the cocoa beans are not the same in the value chain. Regarding the application of post-harvest practices, the study shows that the processing companies don't have a real interest in buying fermented beans and they rather buy almost raw beans at a low price. The conclusion is that farmers involved in the SCPP have the possibility to produce a higher volume of cocoa beans but a market for fermented beans has to be created in order to add more value to the cocoa beans from Indonesia.

Keywords— **Sustainable Cocoa Production Program (SCPP), quality analysis, fermentation, Indonesian cocoa value chain.**

INTRODUCTION

Cocoa (*Theobroma cacao L.*) is a tropical tree which grows within 15 to 20 degrees latitude from the Equator (World Cocoa Foundation (WCF) 2014). Cocoa production in Indonesia appeared during the 1980s when the Bugis, an ethnical group from Sulawesi, returned from Malaysia after spending several years on the cocoa fields (Akiyama et Nishio 1996). In Indonesia, cocoa production is the main source of income for over 1,400,000 smallholder farmers and their familie (Witjaksono et Asmin 2016). The size of the plantation is typically around one hectare (Cocoa Sustainability Partnership (CSP) 2013) and the yield varies between 500 and 700 kg/ha and can go up to 1500 kg/ha (Witjaksono and Asmin 2016). Indonesia is the third producer of cocoa beans in the world after Ivory Coast and Ghana. In 2016, Indonesia represented 8% of the world cocoa production. Ivory Coast was the first with 45% followed by Ghana with 23% (Statista 2016).The Indonesian production is mainly represented in bulk, unfermented and poor quality of beans called FAQ (Free Air/ Fair Average Quality) (Panlibuton et Meyer 2004). Around 95% of the produced beans are not or only partially fermented or unintentionally low fermented (Beckett 2004).

The Indonesian cocoa sector presents many advantages: low cost and high production capacity, efficient infrastructures to transport and export the beans and open trading (United States Agency International development (USAID) 2006). Many problems are highlighted regarding the agricultural practices in the cocoa sector in Indonesia.

The first one is the age of the trees. The majority of the trees were planted around 1980 during the boom of cocoa sector in Indonesia and have not been replanted (Global Business Guide Indonesia 2014). The second one is the lack of technical knowledge of the farmers (Swisscontact 2015). In some areas, productivity has fallen behind because farmers switched to growing rubber or palm oil (Global Business Guide Indonesia 2014). In Indonesia, around 90% of the cocoa is produced by smallholder farmers. An estimated 60% of them live below the poverty line with less than 2.50 USD/day (Swisscontact 2016a).To provide support to the farmers, Swisscontact implemented the Sustainable Cocoa Production Program (SCPP) in 2012 to improve their competitiveness in the cocoa value chain. This intervention on farm-level helps farmers to increase their production of cocoa beans with different kinds of support, like trainings on agricultural and nutritional good practices and integration of gender sensitivity, improvement of the farmers' organizations, providing better access to the market and to finances (Swisscontact 2016b).

The main objective of the research was to describe the perception of the quality of cocoa beans during the post-harvest processing along the value chain and to measure the impact of the Sustainable Cocoa Production Program (SCPP) on agricultural practices on post-harvest processing- fermentation, drying, sorting- at farm-level in the district of Kolaka Timur. The aim was to answer to these six hypotheses:

(I) The implementation of the SCPP have a positive impact on the social conditions (access to running water, electricity, diversified food and way of transportation) and post-harvest-practices of farmers (fermentation, method of drying and sorting of the beans).

(II) The introduction of SCP Program in the target area (district Kolaka Timur) has a positive influence on the perception of the quality of cocoa beans and the application of the main criteria of SNI 2323:2008 – Cocoa Beans on farm-level (Badan Standardisasi Nasional 2017).

(III)The stakeholders in the value chain have different quality criteria regarding the dried cocoa beans and use different quality control tools.

(IV) The UTZ (certification which proves to the consumers that the raw material of their food comes from a sustainable source (UTZ 2015)) certification is well implemented in the District of Kolaka Timur and farmers are satisfied about the label.

(V) The women in the cocoa production have an important role for the work in the garden and the support of the family.

(VI) The implementation of SCPP permits improvements on farm-level for incomes, knowledges and quality of cocoa beans.

MATERIALS AND METHODS

The data collection was done in the district of Kolaka Timur (analysis of cocoa farmers, cocoa collectors and women for the gender equity) and an analysis of some organisations and companies working in the cocoa sector was conducted in Makassar and in Bali (Fig. 1).

During the field research 58 farmers, distributed in three different groups, were interviewed. The distribution of the groups is the following: Group 1: 22 SCPP without UTZ certification, group 2: 16 SCPP with UTZ: 16 and group 3: 20 Farmers not involved in the program. For the interviews of SCPP farmers (with and without UTZ certification), the farmers were randomly selected in two different villages, Wonuambuteo and Mokupa. In each village two different farmer's groups were selected and 10 farmers from each group were randomly interviewed.

The selection of none-SCPP farmers was not a random selection because it would have been quite difficult to find farmers who were not involved in the program in those villages where SCPP was present.8 traders' and farmers' cooperatives were also interviewed. The objective of the interviews with the traders was to compare the tools and criteria used by the collectors to check the quality of the dried beans.

Additionally, 32 women were interviewed. The women were randomly chosen to evaluate the importance of the work of women on the fields for the cocoa production and their role within the household.

The stakeholder analysis was used as a method to analyse the actors of the cocoa sector in Indonesia with the aim to gain information about the cocoa value chain in Indonesia and to understand the different perceptions of the quality according to each company.

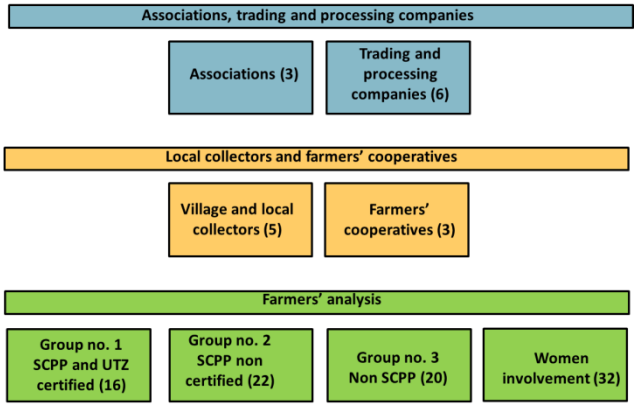

Figure 1: Illustration of the method of research

RESULTS AND DISCUSSIONS

Social conditions of farmers and agricultural characteristics

There is no main difference between the three groups regarding their general characteristics and the level of education. All three are defined by male dominance, married with an average of age between 41 and 44 years. Most of the cocoa farmers (44/58) also have an additional source of incomes. The kind of source of income is not only in relation with the group but mainly with the area of living. As for the living conditions, all the farmers have a good access to water, electricity, a diversified diet and have a means of transportation, mainly motorbike or public transportation, to go to the main city.

Post-harvest processing on farm-level

Fermentation

The farmers in Indonesia don't do bean fermentation because there is no specific market for it and there is no advantage regarding the price. The theory can be confirmed by the results of the study: only eight farmers did the fermentation of the beans before selling them. Discussing fermentation of cocoa beans, if all the farmers are considered, 19 of them (38%) didn't do fermentation because it was not profitable. They don't have any motivation to improve the quality of the beans because there is no better price for fermented beans.

Drying

All the farmers involved in the study dry their beans after the harvest. Regarding the method of drying, they use two main methods:

1. Use of a wooden or bamboo equipment (drying beds)
2. On the floor (on plastic/tarpaulin or directly on the road)

In group no.1 SCPP and UTZ, 62% of the farmers used a wooden or bamboo equipment and 38% of them put their beans on the pavement. In group no.2, 86% of the farmers put their beans on the floor on a tarpaulin and only 14% of them used equipment. In the group no.3, 90% of them used bamboo and 10% didn't.

Figure 2: The two main methods to dry the cocoa beans in the District of Kolaka Timur: On the left side the drying of the beans is made on bamboo equipment and on the right the beans are on the floor spread out on tarpaulin. Photo: Noémie Schaad

Sorting

For sorting, except for group no.1, the majority of farmers didn't make difference between good and bad quality of beans before selling.

Quality perception in the value chain

During the study, eleven quality criteria used by the industries, processing companies and in the SNI 2323:2008 were evaluated (Table 1).

Table 1 : Quality criteria proposed and checked by the farmers. Local collectors and associations and companies

Proposed criteria	**Farmers**	**Local collectors**	**Companies/ associations**
Uniform size of the beans	X	✓	✓
Broken beans	✓	✓	✓
Beans free from clusters	✓	✓	✓
Free from mites	✓	✓	✓
Free from foreign matter	✓	✓	✓
Bean count	X	✓	✓
Slaty beans	X	✓	✓
Mouldy beans	✓	✓	✓
Insects damaged	✓	✓	✓
Insects infected	✓	✓	✓
Germinated beans	✓	✓	✓
Proposed only to the local collectors and companies			
Moisture content	-	✓	✓
% of waste by weight	-	✓	✓
Smoky smell	-	X	✓
Colour	-	X	✓

The traders are more likely to use quality criteria (Table 1). For the quality, all traders thought it was important to check the quality except for one who said it was important only on bigger scale and he bought every kind of beans. All the criteria were important for the traders except for the colour and the smoky smell because that is a criterion to evaluate fermented beans and they almost never receive any. The associations and companies check all the proposed criteria.

UTZ

Only 16 farmers involved in the study were UTZ certified. 6 farmers didn't have any interest in the certification. Three of them didn't have any specific motivation and three of them didn't know what UTZ was. The other are UTZ certified to improve their knowledge, increase their incomes and produce a better quality of cocoa beans. 44% percent of the farmers were very satisfied about UTZ and 19% stated they were satisfied. It means that 63% of the farmers have a positive reaction to the program.

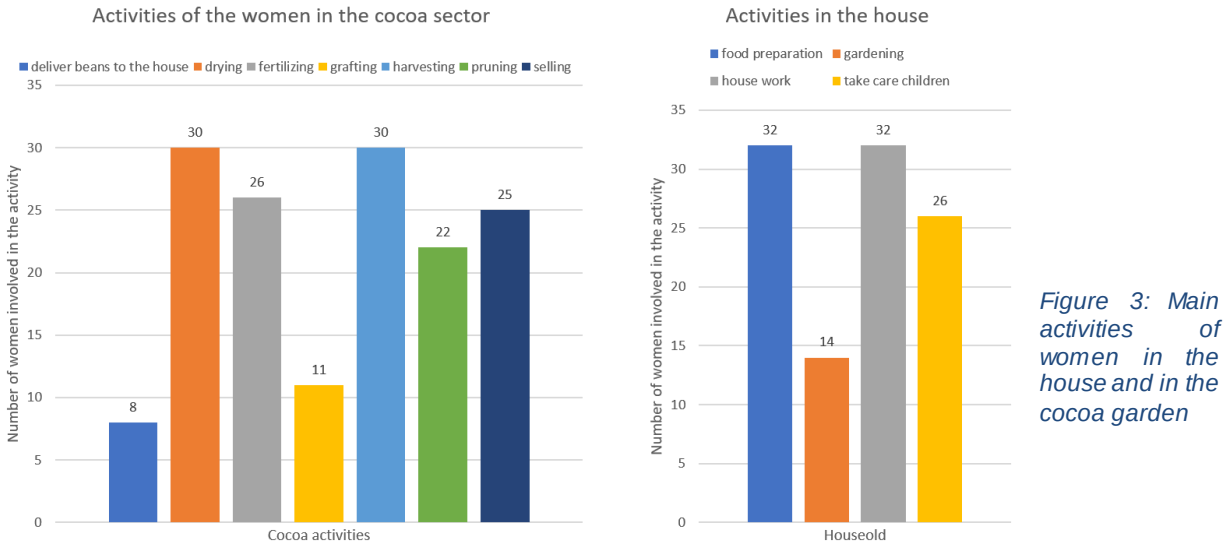

Figure 3: Main activities of women in the house and in the cocoa garden

Involvement of the women in the cocoa sector

Women are responsible for all the activities in the household (fig. 3). They work a lot in the garden with their husbands. Regarding the housework, women do everything and never receive any help from their husbands. They taking care of 100% of the activities in the house: food preparation, taking care of the children and the housework. Sometimes they receive help from their children, their mothers and one from her younger brother. According to them men almost never participate to the housework. They only work in the cocoa field.

Impact of the SCPP

Regarding the productivity, group no.1 has the biggest yield of cocoa beans per hectare with 858.4 kg of beans/ ha. The second one is group 2 involved in the SCPP without certification with 497.2 kg/ ha and the third one is group 3 with 218.4 kg/ha.

When observing the productivity of the cocoa trees of the three groups, group no.1 has the biggest annual yield of cocoa beans and the members have more productive trees in their garden. Their trees also stay productive even if the average age of them is 25.5 years (fig. 5).

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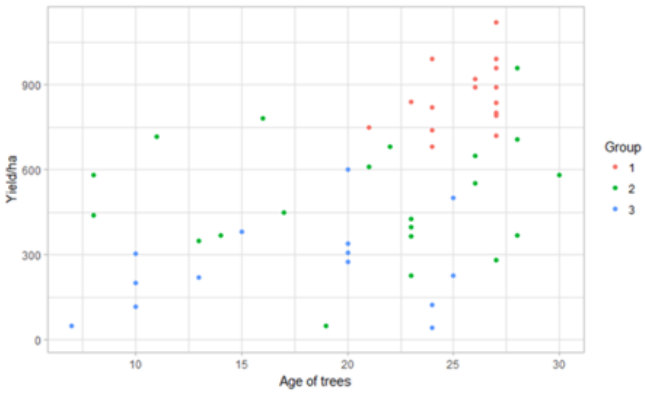

Figure 4: Correlation between the yield of the three groups and the age of the cocoa trees

Discussion

Regarding the social conditions of the farmers, there are no specific social differences between the three groups. For the living conditions, the access to basic living criteria is not an issue for the interviewed farmers. In terms of productivity, the results show that after four years involved in the SCPP, the annual production of farmers is around twice as much than the farmers' involved only for some months (first baseline on April 2016). For the post-harvest practices, 12% of the farmers perform the cocoa fermentation without any financial motivation because the

local collectors do not make a difference between fermented and non-fermented beans. The observation is the same regarding the processing companies. Except for one, all of them make trading with FAQ in Sulawesi. There are inequalities in the value chain regarding the criteria to analyse the quality of the dried cocoa beans. At the bottom of the value chain, the farmers don't have any specific tools to check the quality of the beans. The stakeholders in the value chain don't use the same quality criteria to evaluate the quality of the beans. The beans are mainly considered as FAQ because of the lack of knowledge on how to add value to them. The FAQ market in Sulawesi is a benefit for trading companies because the price is lower and they can use the beans as filler beans.

Results indicated that farmers are satisfied with the UTZ certification. For the farmers, UTZ represents an opportunity to have a better quality of cocoa beans, which improves their source of income and knowledge. UTZ is an additional motivation to apply the recommendations of the SCPP in the field to increase the quality of the beans.

Women are powerful in the cocoa field and in the household as well and they play an important role in their families. The workload of the women is bigger than a man and that is totally accepted. They don't receive any recognition even if the women themselves maintain the structure of the family. All the farmers had a positive reaction regarding the trainings and the intervention of Swisscontact.

CONCLUSIONS

This study permits to analyse the challenges of the production of cocoa beans in Sulawesi, Indonesia. The farmers would be interested in producing good quality beans but the global market only demands FAQ beans from Sulawesi.

The creation of the SCPP has a positive effect on the productivity of the cocoa production on farm-level and on the knowledge of the farmers regarding the post-harvest practices. The results show the success of the intervention at farm-level and the positive impact of the involvement of the farmers directly in the program.
This study gives an answer to the following assumptions:

1. The implementation of the SCPP brought a better productivity and improved the methods of post-harvest treatments. The SCPP farmers have higher income and can afford more.
2. The introduction of the SCPP in the target area (district Kolaka Timur) has a positive impact on the perception of the quality of cocoa beans but the SCPP farmers' groups use the same tools and criteria to evaluate the quality of the beans.
3. The stakeholders in the value chain have different quality criteria regarding the dried cocoa beans and use different quality control tools.
4. The UTZ certification is well implemented in the District of Kolaka Timur and farmers are satisfied with the certification.
5. Women play a key role in the cocoa sector: They support their husbands on the cocoa field and they take care of their households as well.
6. The implementation of the SCPP permits some improvements on farm-level in incomes, in knowledge and in the quality of cocoa beans after about four years.

The best perspective for a farmer would be to create a market for fermented beans in Sulawesi and to create an additional value for the cocoa beans with the implementation of the fermentation on farm-level. The key to maintain a good quality of cocoa beans in the whole value chain is to link all the stakeholders to each other.

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